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WHY MANUFACTURERS OF ELECTRICAL AND ELECTRONIC EQUIPMENT (EEE) CREATE PRODUCER RESPONSIBILITY ORGANIZATIONS (PROs) TO COMPLY WITH THE WEEE DIRECTIVE? THE CASE OF ERP ITALIA SRL WITH FOCUS ON COSTS

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Abstract

This paper investigates the role of collective organizations created by producers to comply with the WEEE Directive. There are limited case studies on these producer responsibility organizations (PROs) despite the crucial role that they play in Extended Producer Responsibility (EPR) schemes. An important aspect in order to evaluate the efficiency of these compliance schemes is the analysis of their internal costs including transaction costs. First of all, this research provides an understanding of the Italian WEEE system for households WEEE. Then, it focuses on one compliance organization and how it deals with physical, informative and financial responsibility that are different aspects of the EPR principle. We provide evidence on the costs incurred by the compliance organizations. We briefly describe the transaction costs involved in operating a collective PRO in comparison to individual scheme. We investigate the issue with the “ERP ITALIA S.R.L.” case study. This is one of the producer responsibility organisations (PROs) operating in Italy and the only pan-European compliance scheme. This will allow future comparative studies with the other branches of ERP across Europe.

Key words: compliance organization, Extended Producer Responsibility, e-waste, PRO, WEEE

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1. Introduction

Extended Producer Responsibility (EPR) is a policy principle which is the basis of the European legislation regulating packaging, end-of-life vehicles, batteries and waste of electrical and electronic equipment (WEEE). The WEEE Directive is the result of a long developing process started in April 1998 as a part of the shift in the European environmental legislation from process to product (Castell et al., 2004). Eventually, the first issue of the Directive was published in January 2003 and it was recast in 2012. After more than 10 years, several scholars advocate that a great amount of work on the topic is still needed. We can assert that the green

design goal and waste prevention have not proven to deliver what expected. If the design for recyclability in plastic products has been somehow introduced (Corabieru et al., 2014) this is not always the case for electric and electronic products (Atasu and Van Wassenhove, 2012; Castell et al., 2004; Gottberg et al., 2006; Khetriwal et al., 2009; Rotter, 2011; Yu et al., 2008).

The “public good” aspect of recyclability prevents the incentive for the producer to design devices easy to recycle (Palmer and Walls, 1999). Moreover, EEE producers argue that it is difficult to design recyclable products when their lifespan is long and the recycling technology is unknown (Wagner, 2009). Therefore, several scholars share the idea that

the drive for eco-design is effective only if producers are responsible for their own end-of-life products. This is also defined as individual producer responsibility (Castell et al., 2004; Lifset et al., 2013). However, this solution would carry important transaction costs. The view that the green design is a missing achievement is shared by several authors (Lifset et al., 2013; Mayers et al., 2011, Mayers and Butler, 2013; Özdemir et al., 2012; Smith in OECD, 2005; Toffel, 2003; Webster and Mitra, 2007). On the other hand, the shifting of responsibility for recycling targets on producers facilitated recycling in all European countries (Massarutto, 2007). Moreover, the WEEE collected in Europe has been recycled at rates between 80% and 95% (Rotter, 2011).

Finally, the overall efficiency of the solutions adopted within the EPR scheme is still an open question (Lifset et al., 2013; Mayers, 2007; Massarutto, 2007, 2014; Palmer and Walls, 1999). Any form of intervention by government or non-government to address market failure must be efficient i.e. the benefits must be greater than the costs. It is widely recognized that PROs are one of the key players of the network design of EPR. However, their role is still controversial (Lifset et al., 2013; Mayers, 2007; Massarutto, 2007; Palmer and Walls, 1999). First, there is no clear agreement on the outcome they could reach (Massarutto, 2007; Mayers, 2007). Second, previous research on detailed operations of PROs is quite limited (Lifset et al., 2013; Mayers and Butler, 2013). We follow this call for a more fine-grained understanding on the efficiency of the solutions adopted within EPR schemes and for empirical research on compliance organisations (Atasu and Van Wassenhove, 2012; Khetriwal et al., 2009; Mayers and Butler, 2013; Walls, 2011). We focus in this paper on a producer responsibility organization (PRO), its responsibilities as well as its efficiency issues.

According to Mayers (2007) in Europe there were 10,000 producers and more than 80,000 European municipal authorities at the time when the author wrote the article. A new subject (PRO) was created in order to deal with the potential complexity of the numerous entities in the field. In fact, as early as 2007, in Europe there were 130 PROs established to deal with WEEE. On this basis, this research has three main objectives. First it explains how the Italian WEEE system for households works. Then it investigates the critical aspects of one producer responsibility organization operating in Italy: ERP ITALIA S.R.L. This is performed analyzing the physical responsibility, the economic/financial responsibility and the informative responsibility. Finally, it underlines the internal costs and transaction costs involved in operating a PRO using the ERP case study. The paper is organized as follows. After this introduction, we provide a theoretical background followed, in section three, by the method that was used. In this section we briefly present the case study and the data collection method.

The results and discussion part contains the analysis of ERP case study divided in the physical responsibility, informative responsibility and economic/financial responsibility. The conclusion section provides an overview of the results as well as its limitation and the need for future studies.

2. Theoretical background

According to Goulder and Parry (2008) the inability of the market to address externalities from pollution is the market failure that seems more central to environmental issues. Coase (1960) within the New Institutional Economics considers externalities a problem of insufficient defined property rights. The theory of New Institutional Economics (NIE) asserts that the change of property rights could force actors to internalize externalities (Demsetz, 1967).

There are several environmental policies that address the externality issue. One of these is the Extended Producer Responsibility principle, a general concept that gradually replaced the product take-back approach (Walls, 2011). The WEEE Directive includes the EPR principle. The European directive changed the property rights among actors by shifting of responsibility toward producers and away from municipalities. According to Buitelaar and Needham (2007), property rights are rules and the rules are institutions. When the property rights are changed to achieve certain results, these are purposeful institutional changes. Property rights and transaction costs are fundamentally interlinked, and they can be considered as two sides of the same coin (Allen, 1991). In his definition property rights are the capability to exercise a choice over a good or service while the transaction costs are the costs to establish and maintain such property rights.

Changing property rights and appointing producers responsible for the end of life products have created several positive aspects. Massarutto, (2014) points out that the implementation of the EPR principle managed to collect and allocate financial resources necessary to fuel the waste management system for WEEE. One interesting question is why producers have created collective systems to comply with the directive. According to Fleckinger and Glachant (2010) producers created associations because bearing the responsibility may be very costly for individual producers. In fact, according to Sachs (2006), individual schemes are affected by substantial transaction costs.

On this basis, it is quite natural to investigate the PRO approach to ERP requirements in terms of responsibilities, production and transaction costs. However, empirical measurement of transaction costs is problematic (Musole, 2009). In fact, according to Buckley and Chapman (1997) it is difficult to measure and assess transaction costs as the most important of them are the avoided costs that would have existed in situations that did not happen. In this respect, producers could choose between manage

their responsibilities individually or by creating organizations.

In general terms, the management of take-back schemes can be carried out by third party organization (TPO) also known as “compliance schemes” (Gregory et al., 2009). The StEP report presents two different approaches to TPOs: own-branded TPOs and non-own-branded TPOs. The solution adopted in most cases (like in Italy) by producers is the second approach, where the compliance schemes collect and treat a share of e-waste arising in the country regardless of their brand. As reported before, according to Atasu and Van Wassenhove (2012), there are no individual producer operated systems in Europe because they may not be cost effective.

The few cases of producers taking care of their own-branded waste products (or individual producer responsibility) are developed only in the business to business (B2B) sector. Regarding the individual producer responsibility in the B2C (business to consumer) sector, there are limited cases such as HP and DELL Computer who encourage the take-back of their products (Van Rossem et al., 2006). However, this solution applies only to a portion of their products and therefore these producers also adhere to a PRO to fulfill their obligations.

To summarize, WEEE PROs are a central as well as controversial players in the EPR scheme. Nevertheless, they have been studied and compared only in few works. In this current paper we analyze one of the operating collection systems and we give some evidence of the structure of the WEEE system in Italy. We draw attention on how it fulfils its responsibilities, its internal costs including a description of transaction costs in comparison to a potential individual solution. We present how the ERP ITALIA S.R.L. complies with the economic responsibility, physical responsibility and informative responsibility as described by Linqvist (1992, 1998). Furthermore, we analyze how ERP ITALIA compliance scheme charges its consortium’s member.

3. Method

3.1. Case study presentation

The ERP S.R.L. company is part of a broader organization named ERP (European Recycling Platform) established in 2002 by four producers of EEE. It developed the idea of setting the first pan-European compliance scheme in response to the European Union’s groundbreaking directive to promote e-waste collection and recycling (Shao, 2009). ERP works in 16 states and has 2403 members in the world. So far, it has collected 2 million tons of e-waste (ERP, 2013). ERP ITALIA S.R.L. was established in 2006 and has one shareholder i.e. ERP SAS France. Also, ERP ITALIA S.R.L. has four “founding members” who

make up the board in charge of the decisions; 35 “European members” and 2300 “local members” and it employs 12 people. In 2012, ERP ITALIA S.R.L. collected 12.63% of national e-waste.

The goals set at heart of the new organization in 2002 were (ERP ITALIA S.R.L. – corporate profile, March 2013): to stimulate market forces and competition; to achieve scale economies to ensure competition and efficiency in recycling; to keep low overheads; to reduce market price for the highest quality available on the market and to support IPR (Individual Producer Responsibility).

ERP ITALIA S.R.L. operates in Italy where a national clearing house (CdC RAEE) was created in accordance to the Italian regulation. It is owned by the 17 Italian WEEE PROs. In 2012 ERP owned 1/9 of the national clearing house. The primary role of the CdC RAEE is to ensure the same market conditions to all members. It defines annually the market share of each producer and it determines which collection sites are assigned to each PRO, on the basis of an algorithm. The Italian branch of ERP has never been analyzed while the UK branch has recently been studied (Butler, 2009; Lee and Shao, 2009; Mayers, 2007; Mayers and Butler, 2013).

3.2. Data collection

In this section we present the case study of ERP ITALIA S.R.L. Following the idea that one of the major strengths of case study is the opportunity to use different sources of evidence (Yin, 2003), our study is based on qualitative and quantitative primary and secondary data. We used a wide range of sources: reports, studies, company presentations, on line publications, company web site, brochures, as well as balance sheets (including “explanation notes”). We accessed the national clearing house data to have useful information on the compliance system. We also analyzed the research papers on the corporate headquarters and on the English branch of ERP. Furthermore, a semi-structured interview was utilized in the meeting in order to gain a deep knowledge and to attain specific details. The content of the interview was disclosed to the company before the meeting. One semi-structured long interview was held at the company premises in July 2013 and it involved two key employees: the head of operations and the head of marketing. The draft document of this paper was submitted for checks and approval to the financial officer of ERP. Inputs, clarifications and corrections were used to review and improve the paper. Additionally, we carried out several interviews to different players of the system. The first and most important one, was a long interview with the head of operations of the national clearing house. Four additional interviews were carried out: two with different recyclers of WEEE, one with an Italian municipality and the last one with the regional director of ERP UK. All of these meetings were executed at their premises and were very important to understand the Italian WEEE system where ERP is

included as well as underline the key differences with the British WEEE system. Data triangulation was used to address the potential problem of construct validity (Yin, 2003). The Italian regulation that implements the WEEE Directive was also studied (Decree n. 151/2005 and following application decrees) in order to frame the case study.

4. Results and discussion

The case study is presented in accordance with the theoretical approach of EPR carried out by Lindhqvist (1992 and 1998) which distinguishes different forms of responsibility: physical responsibility, economic responsibility and informative responsibility. The physical responsibility characterizes the systems when the producers have to deal with the physical management of the end-of-life products.

The economic responsibility means that the manufacturers bear the full or partial cost for the collection, recycling or disposal of the product manufactured. The informative responsibility requires producer to supply information on the environmental property of the products. In the next section we present ERP case study within the Italian system for WEEE. We distinguish the physical responsibility, the financial/economic responsibility and the informative responsibility of the compliance organization.

4.1. Physical responsibility

In Italy producers can fulfill their physical obligations (collection, treatment and recovery) either individually or joining a collection system according to the national regulation that implement the WEEE directive (Decree no. 151/2005). The solution adopted by all Italian producers is to join a PRO. More precisely, all the 17 existing PROs are collective organizations. ERP ITALIA S.R.L is one of these. In Italy the national clearing house (CdC RAEE) is established by law together with other institutes that manage the system (Ministerial decree n. 185/2007). Each collection system has to register to the CdC RAEE and its main task is to ensure uniform and homogeneous conditions to the collective systems. Having a national clearing house reduces transaction costs related to support and administer the program as well as it reduces costs for the monitoring operations. CdC RAEE determines the market share of each collective system which is proportionate to the amount of EEE put on the market in the previous year by the producers associated to that specific PRO.

Compliance organizations have to collect e-waste from the assigned collection points. These municipal and the retailers collection points contact the national clearing house when the quantity of WEEE collected needs to be picked up by the compliance organizations. The national clearing house assigns the collection sites in the national

territory to the compliance organizations based on a complex algorithm, which incorporates several variables. The variables taken in consideration are: the quantity of WEEE collected in each collection point, the physical allocation of the collection point, the ease to reach the collection point and so on. Compensations on quantities collected are made the year after by reassigning the collecting points to the producers. In this way there are not fee compensations between producers. Therefore, ERP ITALIA S.R.L states that PROs do not compete on e-waste collection, since the collection activity is decided by CdC RAEE but they compete on the services provided to the customers.

Transaction costs related to research and information gathering are reduced during the collection phase. This is quite different from the situation in the UK, for example, where ERP- UK (like the other British PROs) has to sign agreements with a sufficient number of collection points in order to reach the amount of e-waste collected that fulfil the responsibility of the members of the system (Mayer et al., 2013). In this respect, for producers enrolled in Italian collective PROs, transaction costs related to e-waste procurement is significantly reduced thanks to the role played by the national clearing house. Moreover, if we consider that an individual responsibility organization should collect and treat a share of its own e-waste by setting a separate collection and treatment route, this would create considerable transaction costs such as research costs, information gathering costs; contracting costs; monitoring/detection costs and prosecution/inducement/conflict resolution costs.

In Italy there are two different types of collection points: retailers collection points (“Luoghi di raggruppamento – LdR”) and municipal collection points (“centri di raccolta – CdR” or “ecopiazze comunali”). By law CdR must accept the e-waste from the local LdR. However, if the LdR is too big for the local CdR then PRO collects e-waste directly from the retailer collection point and sent to the treatment facility. The compliance organizations through the CdC RAEE recognize incentives to the collection sites which reach some defined threshold. These compensation fees are regulated by deals signed by CdC RAEE, the national association of municipalities and the retailer organization.

Producers do not have property rights on e-waste, nor PRO. The property of the e-waste belongs to the CdR or LdR when is discharged by end users and it is then owned by recyclers when it reaches their premises. PROs don't have the property on e-waste: they offer a service to pass them from the collection points to the recycler points. When the CdR or LdR collect enough e-waste, they contact the CdC RAEE. Then CdC RAEE contacts the collection scheme that has in charge that specific collection point. In this way, possible changes due to the reassignment of collection point to another PRO do not create a disservice to third parties. Typical transaction costs due to research and information

gathering are reduced. CDC RAEE established a “maximum time of intervention” i.e. the maximum time from the moment in which the subscriber (either CdR or LdR) requires the intervention and the moment in which the PRO withdraws the WEEE from the collection point. In 2012 ERP ITALIA S.R.L reached on average 98.38% of the target. Then each PRO establishes a deal with transporters and recyclers to perform the operations. ERP ITALIA S.R.L has few contracts with companies that transport and recycle the e-waste. These agreements reduce transaction costs if compared to an individual producer organization which has to find, collect and treat its own products. Several transaction costs are reduced such as research and information gathering costs, contracting costs; monitoring/detection costs and prosecution/inducement conflict resolution costs. On the other hand, compliance organizations can provide a stable flow of e-waste to the contractors (logistic and treatment operators) with contractual conditions fixed for few years. This situation reduces the problem of hold-up especially for the recyclers and it allows long term investments.

The recyclers have to be accredited as enterprises of the treatment of WEEE by the CdC RAEE in accordance with its technical specification. The accreditation is based on a specific audit conducted by third-party certifiers which are selected and approved by the CdC RAEE. In 2013 (CdC RAEE web site) there are 113 waste treatment plants. Each of them is accredited for one or more of the five groups of WEEE (R1-R5 following in the Italian legislation). According to the data provided by ERP ITALIA S.R.L, the recycling performance (including energy recovery) reached 90% in 2012.

4.2. Financial/economic responsibility

Producers are responsible for financing of collection, treatment, recovery and environmentally sound disposal of WEEE. As for the physical responsibility, the legislation allows to fulfil this obligation either individually or by joining a collective scheme (WEEE Directive). The Italian regulation (Decree no 151/2005) concedes the same options to producers. ERP founders claim that they contributed in changing the paradigm in European e-waste recycling by breaking with the monopolistic

mentality and introducing competition among PROs (Shao, 2009). This allowed ERP to reduce average take-back costs significantly (Atasu and Van Wassenhove, 2012). According to Mayers and Butler (2013), EPR was founded by producers in order to have more control and lower costs in the delivery of take-back services for WEEE. In order to investigate the reduction of average take-back costs and therefore the improved efficiency, we analyze the internal costs of the PRO. We assess the cost structure of ERP ITALIA S.R.L. in the last three year (2010-2012) (Table 1). Following the Remedias scheme (2012), we classify the costs in the following categories: treatment costs, logistic costs, performance bonuses (provided to collection points), communication costs and structure costs (including national clearing house).

The break-down information on treatment and logistic costs in 2010 and 2012 have been provided directly from the ERP. Total treatment and logistic costs decreased over time for two main reasons: the company became more efficient and the value of the metal recovered from e-waste increased. More specifically, in 2012, ERP managed to reduce these costs thanks to the new business model that allows ERP to select contractors in the market instead of having one single dealer as in year 2010. In fact, while up to the first part of 2011, the general contractor was in charge of the selection of suppliers and the pick-up activities, from the second part of 2011 ERP internalized these activities with an appropriate internal structure. This new business model explains the increase of the structural costs and, more important, it clarifies the decrease in the cost per ton of e-waste managed by the consortium.

On the other hand, the cost allocation under collective systems is a crucial aspect of EPR design (Atasu and Van Wassenhove, 2012; Fleckinger and Glachant, 2010; Lifset et al., 2013). It can influence its efficiency as well as the incentives to waste prevention. Therefore, we analyze in detail how this compliance scheme works out the cost allocation among its members.

According to Forslind (2009), the EPR program can be implemented with two different financial schemes: “pay-as-you-go system” (PAYG) or “insurance system”.

Table 1. Cost classification for ERP ITALIA S.R.L. during years 2010, 2011 and 2012

	<i>YEAR 2012</i>	<i>%</i>	<i>PER TON</i>	<i>YEAR 2011</i>	<i>%</i>	<i>PER TON</i>	<i>YEAR 2010</i>	<i>%</i>	<i>PER TON</i>
Treatment costs	€ 1,887,389	23.59	€ 62.76	€ 3,158,423	26.79	€ 85.42	€ 3,241,142	30.98	€96.77
Logistic costs	€ 3,505,152	43.81	€ 116.55	€ 5,865,642	49.76	€158.64	€6,019,265	57.53	€179.72
Performance bonuses	€860,421	10.76	€28.61	€ 1,052,545	8.93	€ 28.47	€799,386	7.64	€23.87
Communication costs	€56,987	0.71	1.89	€ 0	0	€ 0	€0	0	0
Structure costs	€1,690,087	21.13	56.20	€ 1,712,107	14.52	€ 46.30	€ 402,493	3.85	12.02
Total costs	€8,000,036	100	€266.02	€ 11,788,717	100	€ 318.83	€10,462,286	100	€ 312.38

Structure costs= tot WEEE production costs – (treatment costs + logistic costs + performance bonuses + communication costs). 2010: 33,492,450 kg collected by ERP; 13.65% ERP share of national collection rate; 2011: 36,975,227 kg collected by ERP; 14.22% ERP share of national collection rate; 2012: 30,073,569 kg collected by ERP; 12.63% ERP share of national collection rate

The PAYG is based on the costs incurred when the products reach their End-of-Life. With the insurance system, producers pay one contribution per product sold (Put on Market - PoM) and this will cover the costs of the end-of-life management when the product is dismissed.

ERP ITALIA charges the operation costs to its members according to one of the following options: the “collected and treated” (same as PAYG system) and PoM tariff (same as the insurance system). ERP promotes the first option. According to the managers of ERP ITALIA S.R.L., the costs paid by their members are as low as possible and they charge producers only the actual costs. These costs are classified by ERP ITALIA S.R.L. in: 1) membership fee (i.e. general costs); 2) registration fee (i.e. cost for the local government); 3) operation costs (i.e. compliance costs). There are two options for the “membership fee”: “local membership” and “European membership”. On one hand, the “local membership” is defined in each Member State and in Italy it is about €200 for customers that have to treat up to 5 tons of EEE. For the customers that have more than 5 tons of EEE, the membership fee is proportionate to the quantity of EEE put on the market (PoM). This fee covers the functionality and fixed costs. On the other hand, the “European membership” works in the same way but the agreement covers at least three European Countries.

Moreover, the “Registration fee” is used to register the producer to the national system. In Italy for example these fees include: €16 for the stamp duty; € 168 for the government and revenue agency tax; €30 for the Chamber of Commerce. The “operation costs” i.e. the compliance costs can be computed in two ways: a) PoM put on market and b) collected and treated. The PoM tariff is set either by units or by kg of product put on the market. The “collected and treated option”, charges the customers for what it is really collected that year and it is computed by multiplying the quantity times the unit costs. The advantage of PoM is that the customer pays a predefined amount of money. The disadvantage of such system is that members have to pay in advance.

The problem for the compliance scheme using this system is to fix the appropriate fee which covers all the costs without accumulating financial reserves. Of course, the compliance solution in place of many single producers solutions reduces the transactions costs related to research and information gathering; support and administration of the ongoing program; contracting; monitoring/detection and prosecution/inducement/ conflict resolution. ERP ITALIA S.R.L. prefers to charge members according to the “collected and treated” way. In order to compute the “collected and treated” tariff, ERP ITALIA S.R.L. multiplies the PoM tariff (fee per ton) by the expected rate of return. The PoM tariff is a fixed tariff computed per ton per each of the five WEEE groups (R1-R5). The expected rate of return

is: tons of WEEE collected in year t+1 divided by tons of EEE sold in year t. Example tons of EEE sold in 2012 = 10,000; tons of WEEE collected in 2013 = 12,500; expected rate of return 125%. Then ERP ITALIA S.R.L. shares the costs between producers based on their market share of the previous year. For ERP ITALIA S.R.L. this is the correct application of art 10 and 11 of DM 151/2005 as producers pay in function of their market share of the year before. ERP ITALIA S.R.L. points out the problem of setting the right tariff and gets the financial sheet balance. This was especially difficult when the systems were set up. According to ERP ITALIA S.R.L., the tariffs applied to its members are the lowest possible and there are no reserves set aside.

It is very important to point out that these two ways that PRP uses to compute the fee and charge the consortium’s members do not include any incentive to eco-design. Design incentives come from the fees differentiation paid for EoL management (Sander, 2007). ERP ITALIA S.R.L. does not apply any individual producer responsibility as there is any cost sharing system based on the actual cost contribution of the EoL product.

In fact, the ERP and other major EE producers say that in order to invest in product recoverability producers need control over final treatment of their products. For Özdemir et al. (2012) collective responsibility does not give any incentive to producers for product recoverability improvement. This vision is supported by other studies (Castell et al., 2004; Mayers et al., 2011; Mayers and Butler, 2013; Smith in OECD, 2005; Webster and Mitra, 2007). Nowadays, individual operating systems can be very expensive and brand sorting activities too costly.

4.3. Informative responsibility

When responsibilities and costs are shifted to collective actors like PROs, which are easier to control, the incentive to comply is strengthened (Massarutto, 2014) and transaction costs are reduced. As reported by Atasu and Van Wassenhove, (2012) regulators need to take into account costs of monitoring and controlling take-back systems. In this respect, the Italian law delegated this duty to the CdC Raee that must collect and process the information provided by the 17 PROs. This reduces the transaction costs, if we compare a solution that involves a myriad of individual PROs established by individual producers. It reduces research and information gathering; lobbying and public participation costs; support and administration of the ongoing program; monitoring/detection.

CdC RAEE has a national call centre where municipal and retailer collection points can submit requests for waste collection and citizens can address general information. In this way any change in the allocation of collection point to a PRO does not create disservices to the users. This reduces

transaction costs for the actors involved such as research and information gathering costs. On the other hand, the national clearing house gets information and controls the system as well as provides equal possibilities to all parties involved. As reported before, producers pay a fee to the chamber of commerce which keeps the public registers of producers (www.registroaee.it). Each producer and PRO has to enroll in this public register. Moreover, producers have several declarations to fulfill such as PoM (quantity of EEE put on market) during the previous year, by the 30th of May; the quantity of e-waste collected by PRO on behalf of its members and the percentage of e-waste recovered (using a form called MUD "single model statement"). Usually ERP is also in charge of declaring the PoM on behalf of its members and it provides additional service. In this way ERP can also check the volumes of the PoM by its members reducing the monitoring/detection cost. In case of differences in volumes, ERP can conduct an audit to the producer.

ERP ITALIA S.R.L. declares a complexity of documentation required by the Italian central government. Moreover, the requirements are different in each member state. A statement by the European commission acknowledges that improvements under the Directive are necessary in order to harmonize the national registration and reporting requirements. Member States' registers for producers of EEE will be integrated more closely. Moreover, the Commission will adopt a harmonized format to be used for the supply of information. Consequently, administrative burdens are expected to decrease (European Commission, 2012).

5. Conclusions

After 10 years from the WEEE Directive publication it is widely recognized that PROs (producer responsibility organizations) play a central role in EPR schemes. Despite this fact, empirical investigations on EPR implementation and on compliance scheme solutions are still limited. This fact has raised several calls to investigate these aspects. This paper provides an overview of the Italian WEEE system for households. It then studies one of the compliance organizations with attention on how it complies with the physical responsibility, economic/financial responsibility and informative responsibility.

The paper provides evidence of the costs incurred by the collective system including the transaction costs. The research also explains how the operations of the ERP ITALY srl are carried out as the previous research on this aspect is limited. Indeed, PROs play a pivotal role in the implementation of EPR scheme as they represent an important interface to organize the financial transactions, collection activities, and communications among governments, producers, waste companies, retailers, and municipal authorities. Furthermore, this centralized organization offers long

term agreements, a more stable market, a reduced hold-up risk. Finally, it encourages specific investments in the recycling industry as well as it counterbalances its market power. Such centralization of activities coordinated by a collective system reduces transaction costs if compared to a multitude of individual producer organizations. The results show that, as pointed out by the previous literature, producers create these organizations because they reduce transaction costs if compared to individual compliance organizations. Furthermore, this paper discloses how compliance organizations, such as ERP, allocate costs among its members.

The research demonstrates the composition of internal costs of ERP S.R.L. ITALIA over time. In this respect, the paper fills a gap in the literature as only important but few case studies on WEEE collective systems are carry out so far. The paper has some limitations. First of all, we investigated only one compliance organization and its internal costs over a limited period of time. Second, the analysis of the revenues aspects of the collective system would have provided a better understanding of the scheme. Future research is needed in order to provide insight of the functioning of other PROs in Italy and in other member states. Additional investigation on other collective systems will allow interesting comparisons on the adopted solutions. Research on best practices solutions for the WEEE system would be also interesting for the business sector.

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